

CLAIMS

What is claimed is:

1. A digital controlled multi-light driving apparatus for driving and controlling a plurality of lights, comprising:

a plurality of oscillation step-up circuits; and

a digital control circuit, which connects to each of the oscillation step-up circuits, generates sets of digital switching signals, and respectively transmits the sets of the digital switching signals to the oscillation step-up circuits, wherein a phase and a duty cycle of each set of the digital switching signals are controlled by the digital control circuit.
2. The driving apparatus of claim 1, wherein each of the oscillation step-up circuits is electrically connected to at least one of the lights.
3. The driving apparatus of claim 1, wherein the lights are cold cathode fluorescent lamps (CCFLs).
4. The driving apparatus of claim 1, wherein each of the oscillation step-up circuits comprises a switching unit and a resonance step-up unit, the switching unit electrically connects to the digital control circuit and performs switching according to one corresponding set of the digital switching signals output from the digital control circuit, and the resonance step-up unit is controlled by the switching unit.
5. The driving apparatus of claim 4, wherein the resonance step-up unit comprises a transformer and a capacitor.
6. The driving apparatus of claim 5, wherein the switching unit comprises two transistors, the transistors electrically connect to the two ends of the capacitor,

respectively, and the transistors are turned on/off according to the corresponding set of the digital switching signals.

7. The driving apparatus of claim 6, wherein the transistors of the switching unit are MOS transistors.
8. The driving apparatus of claim 6, wherein the transistors of the switching unit are bipolar transistors.
9. The driving apparatus of claim 8, wherein the switching unit further comprises two resistors, one end of each of the resistors electrically connects to the base electrode of each corresponding transistor, respectively, and the other end of each of the resistors electrically connects to the digital control circuit.
10. The driving apparatus of claim 1, wherein the digital control circuit further comprises:
 - a digital switching signal generating circuit, which electrically connects to each of the oscillation step-up circuits, and generates the sets of the digital switching signals respectively input to the oscillation step-up circuits; and
 - a multiplex feedback-control calculating circuit, which controls the digital switching signal generating circuit, and controls the duty cycles of the sets of the digital switching signals generated by the digital switching signal generating circuit according to feedback signals from the lights.
11. The driving apparatus of claim 10, wherein the multiplex feedback-control calculating circuit is a digital single-chip microprocessor.
12. The driving apparatus of claim 10, wherein the multiplex feedback-control calculating circuit comprises:
 - a multiplex unit, which electrically connects to each of the lights;

a detecting unit, which electrically connects to the multiplex unit to detect the feedback signals from the lights;

an A/D converting unit, which converts the feedback signals into digital feedback signals, respectively; and

a control-calculating unit, which controls the multiplex unit and further controls the digital switching signal generating circuit according to the digital feedback signals.

13. The driving apparatus of claim 10, wherein the multiplex feedback-control calculating circuit comprises:

a plurality of detecting units, which electrically connect to the lights and detect the feedback signals respectively input from the lights;

a multiplex unit, which electrically connects to each of the detecting units;

an A/D converting unit, which electrically connects to the multiplex unit and converts the feedback signals into digital feedback signals, respectively; and

a control-calculating unit, which controls the multiplex unit and further controls the digital switching signal generating circuit according to the digital feedback signals.

14. The driving apparatus of claim 10, wherein the multiplex feedback-control calculating circuit comprises:

a plurality of detecting units, which electrically connect to the lights and detect the feedback signals respectively input from the lights; and

a digital single-chip microprocessor, which electrically connects to each of the detecting units and controls the digital switching signal generating circuit

according to the feedback signals detected by the detecting units.

15. The driving apparatus of claim 14, wherein the digital single-chip microprocessor comprises:
 - a multiplex unit, which electrically connects to each of the detecting units;
 - an A/D converting unit, which electrically connects to the multiplex unit and converts the feedback signals into digital feedback signals, respectively; and
 - a control-calculating unit, which controls the multiplex unit and further controls the digital switching signal generating circuit according to the digital feedback signals.
16. The driving apparatus of claim 10, wherein the multiplex feedback-control calculating circuit comprises:
 - a plurality of detecting units, which electrically connect to the lights and detect the feedback signals respectively input from the lights;
 - a multiplex unit, which electrically connects to each of the detecting units; and
 - a digital single-chip microprocessor, which electrically connects to the multiplex unit and controls the digital switching signal generating circuit according to the feedback signals detected by the detecting units.
17. The driving apparatus of claim 16, wherein the digital single-chip microprocessor comprises:
 - an A/D converting unit, which electrically connects to the multiplex unit and converts the feedback signals into digital feedback signals, respectively; and
 - a control-calculating unit, which controls the multiplex unit and further controls the digital switching signal generating circuit according to the digital

feedback signals.

18. The driving apparatus of claim 10, wherein the feedback signals are current signals.
19. The driving apparatus of claim 10, wherein the feedback signals are voltage signals.